

## Fetal Echocardiography Examination Content Outline

### (Outline Summary)

#	Domain	Subdomain	Percentage
1	Gather pertinent medical history prior to exam		7%
2	Anatomy and Physiology		25%
3	Perform the exam	<ul style="list-style-type: none"> <li>Clinical care and safety</li> <li>Exam Techniques &amp; measurements</li> <li>Assess fetal cardiac function and hemodynamics</li> </ul>	34%
4	Evaluate pathology and pathophysiology	<ul style="list-style-type: none"> <li>Assess abnormal physiology and perfusion</li> <li>Identify and assess congenital anomalies</li> </ul>	34%

### (Detailed Outline)

<b>1</b>	<b>Gather pertinent medical history prior to exam 7%</b>
1.A.1	Review referral information and clarify pertinent data and indications for exam (e.g., review genetic testing results, prior sonographic studies, risk factors)
1.A.2	Correlate known genetic syndromes and chromosomal anomalies with expected exam findings
1.A.3	Correlate history of maternal disease and drug exposure with expected exam findings (e.g., maternal congenital heart disease, lupus, diabetes, indomethacin use)
1.A.4	Correlate extracardiac anomalies with expected exam findings (e.g., CHARGE, VACTERL syndromes)
<b>2</b>	<b>Anatomy and Physiology 25%</b>
2.A.1	Understand normal embryologic development (e.g., early chamber development, normal septal formation)
2.A.2	Identify fetal anatomic structures related to the abdomen/pelvis (e.g., inferior vena cava, ductus venosus, hepatic veins, stomach, bladder, spleen)
2.A.3	Identify fetal anatomic structures related to the chest/thorax (e.g., lungs, esophagus, trachea, thymus, diaphragm)
2.A.4	Distinguish anatomy of the tissues composing the heart (e.g., pericardium, myocardium)
2.A.5	Identify normal cardiac chamber morphology and position
2.A.6	Identify septa (e.g., atrial, ventricular, and arterial septa)
2.A.7	Identify normal atrioventricular and semilunar valve morphology

2.A.8	Identify systemic veins, and arteries
2.A.9	Identify outflows
2.A.10	Identify pulmonary veins and arteries
2.A.11	Identify aortic arch
2.A.12	Identify ductus arteriosus
2.A.13	Identify ductus venosus
2.A.14	Identify umbilical vein and arteries
2.A.15	Understand the fetal cardiac electrical conduction system (e.g., SA node, AV node)
<b>3</b>	<b>Perform the exam</b>
<b>3.A</b>	<b>Clinical care and safety</b>
3.A.1	Recognize and inform the supervising physician of fetal critical findings (e.g., sustained bradycardia/tachycardia, fetal demise, hydrops, anhydramnios)
3.A.2	Monitor and adjust exam based on maternal clinical symptoms (e.g. supine hypotensive disorder, severe headache, unrelenting vomiting)
<b>3.B</b>	<b>Exam Techniques &amp; measurements</b>
3.B.1	Select transducer and console settings appropriate for the exam
3.B.2	Evaluate multiple gestations and associated cardiac complications (e.g., fetal position, number; twin-to-twin transfusion syndrome)
3.B.3	Determine visceral-atrial situs (e.g., Cordes and other methods)
3.B.4	Evaluate and obtain standard cardiac views
3.B.5	Evaluate and obtain standard views of great vessels (e.g., branch pulmonary arteries, systemic veins, pulmonary veins, aortic and ductal arches)
3.B.6	Determine orientation and relationship of the great vessels using standard cardiac views
3.B.7	Perform measurements of chamber size using two-dimensional and M-mode techniques
3.B.8	Perform measurements of cardiac valves and great vessels
3.B.9	Perform measurement of cardiothoracic (CT) ratio
3.B.10	Perform fetal biometric measurements (e.g., biparietal diameter [BPD], head circumference [HC], abdominal circumference [AC], femur length [FL])
<b>3.C</b>	<b>Assess fetal cardiac function and hemodynamics</b>
3.C.1	Assess ventricular function
3.C.2	Assess function of atrioventricular and semilunar valves using color and spectral Doppler (e.g., regurgitation, stenosis)
3.C.3	Assess fetal heart rate and rhythm using Doppler and M-mode
3.C.4	Use spectral and color Doppler to assess middle cerebral artery (MCA), umbilical arteries, umbilical vein, and ductus venosus

3.C.5	Use spectral and color Doppler to assess pulmonary and systemic veins
3.C.6	Use spectral and color Doppler to assess pulmonary and systemic arteries
3.C.7	Assess mechanical PR intervals
<b>4</b>	<b>Evaluate pathology and pathophysiology 34%</b>
<b>4.A</b>	<b>Assess abnormal physiology and perfusion</b>
4.A.1	Recognize signs of fetal distress (e.g., abnormal fluid collections, cardiomegaly, hemodynamics)
4.A.2	Evaluate for the presence of fetal cardiomyopathies
4.A.3	Evaluate for the presence of fetal dysrhythmias
<b>4.B</b>	<b>Identify and assess congenital anomalies</b>
4.B.1	Evaluate for abnormalities related to genetic syndromes (e.g., trisomy 21, Noonan, monosomy X, 22q11 deletion)
4.B.2	Evaluate for cardiac malpositioning
4.B.3	Identify and assess heterotaxy syndromes
4.B.4	Identify and assess cardiac septal defects
4.B.5	Identify and assess left-sided cardiac anomalies
4.B.6	Identify and assess right-sided cardiac anomalies
4.B.7	Identify and assess conotruncal anomalies
4.B.8	Identify and assess systemic venous anomalies
4.B.9	Identify and assess pulmonary venous anomalies
4.B.10	Identify and assess aortic arch anomalies
4.B.11	Identify and assess ductus arteriosus abnormalities
4.B.12	Identify and assess ductus venosus anomalies
4.B.13	Identify and assess congenital cardiac masses
4.B.14	Identify and assess cardiac changes with thoracic anomalies
4.B.15	Assess abnormal blood flow across cardiac valves and vessels

**Knowledge, Skills, and Abilities:**

*The following is a list of the foundational knowledge, skills, and abilities required to complete the tasks listed in the content outline.*

Ability to identify familial, maternal, and fetal risk factors prior to the exam and correlate with expected exam findings

Understand how to determine fetal position, situs, and cardiac axis

Knowledge of normal and abnormal fetal heart rate and rhythms and appropriate modalities to evaluate them

Knowledge of normal and abnormal waveforms across fetal cardiac valves and vessels

Understanding of fetal hemodynamics; knowledge of how abnormal hemodynamics affect the heart

Understanding of critical maternal and fetal clinical findings that require immediate attention during the performance of the exam

Knowledge of ultrasound system settings to optimize image quality and hemodynamic evaluation

Ability to identify and understand artifacts

Knowledge of genetic syndromes and chromosomal anomalies and their associated fetal cardiac findings

Knowledge of extracardiac anomalies and their associated cardiac findings

Ability to recognize and evaluate cardiac anomalies

Knowledge of how to obtain standard cardiac anatomic views and protocols for evaluating the fetal heart

Ability to perform standard measurements to determine normal vs abnormal cardiac structures and function.

Knowledge of fetal embryology

Understand the fetal electrical conduction system